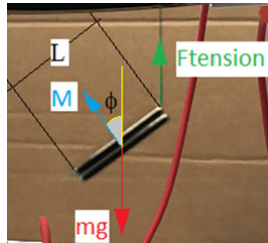


Physics II

Magnetic Moment

Problem 1.- Calculate the magnetic moment of a magnet in a vertical external field with magnitude 0.8 mT if it is in equilibrium tilted an angle $\phi = 35^\circ$. The mass of the magnet is 9 grams, and its length is $L=2\text{cm}$.



Solution: The torque produced by the weight is $\tau = mg \frac{L}{2} \cos \phi$ and the torque produced by the magnetic moment is $\tau = MB \sin \phi$. They must be equal for equilibrium, so:

$$mg \frac{L}{2} \cos \phi = MB \sin \phi \rightarrow M = \frac{mgL}{2B \tan \phi}$$

With the values of the problem

$$M = \frac{mgL}{2B \tan \phi} = \frac{0.009 \times 9.8 \times 0.02}{2 \times 0.0008 \times \tan 35^\circ} = \mathbf{1.57 \text{ J/T}}$$